Section 6.2

Check Your Understanding, page 367:

1. $Y = 500X$. $\mu_Y = 500\mu_X = 500(1.1) = \$550$. $\sigma_Y = 500\sigma_X = 500(0.943) = \$471.50$
2. $T = Y - 75$. $\mu_T = \mu_Y - 75 = 550 - 75 = \$475$. $\sigma_T = \sigma_Y = \$471.50$.

Check Your Understanding, page 376:

1. $\mu_T = \mu_X + \mu_Y = 1.1 + 0.7 = 1.8$. Over many Fridays, this dealership sells or leases about 1.8 cars in the first hour of business, on average.
2. Because X and Y are independent, $\sigma_T^2 = \sigma_X^2 + \sigma_Y^2 = (0.943)^2 + (0.64)^2 = 1.2988$ so $\sigma_T = \sqrt{1.2988} = 1.14$.
3. The total bonus is $B = 500X + 300Y$. This means that $\mu_B = 500\mu_X + 300\mu_Y = 500(1.1) + 300(0.7) = \$760$. Because X and Y are independent, $\sigma_B^2 = (500\sigma_X)^2 + (300\sigma_Y)^2 = (500)^2(0.943)^2 + (300)^2(0.64)^2 = 259{,}176.25$. Therefore $\sigma_B = \sqrt{259{,}176.25} = \$509.09$.

Check Your Understanding, page 378:

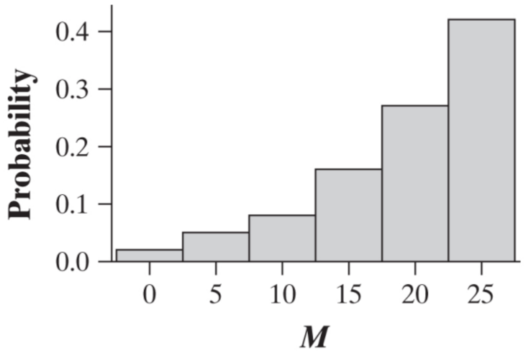
1. $\mu_D = \mu_X - \mu_Y = 1.1 - 0.7 = 0.4$. Over many Fridays, this dealership sells about 0.4 cars more than it leases during the first hour of business, on average.
2. Because X and Y are independent, $\sigma_D^2 = \sigma_X^2 + \sigma_Y^2 = (0.943)^2 + (0.64)^2 = 1.2998$ so $\sigma_D = \sqrt{1.2998} = 1.14$.
3. $B = 500X - 300Y$. This means that $\mu_B = 500\mu_X - 300\mu_Y = 500(1.1) - 300(0.7) = \$340$. Because X and Y are independent. $\sigma_B^2 = (500\sigma_X)^2 + (300\sigma_Y)^2 = (500)^2(0.943)^2 + (300)^2(0.64)^2 = 259{,}176.25$. Therefore $\sigma_B = \sqrt{259{,}176.25} = \$509.09$.

Exercises, page 382:

6.35 The relationship between the length in centimeters and the length in inches is $Y = 2.54X$. So $\mu_Y = 2.54\mu_X = 2.54(1.2) = 3.048$ cm and $\sigma_Y = 2.54\sigma_X = 2.54(0.25) = 0.635$ cm.

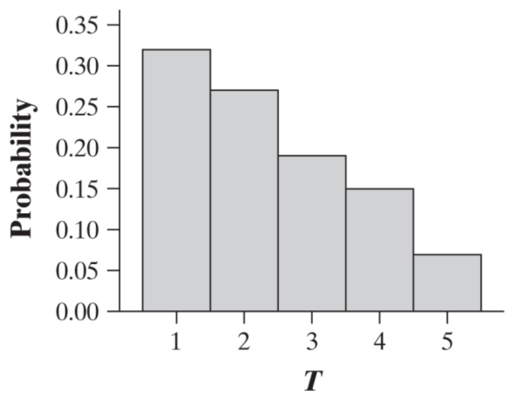
6.36 The relationship between heights in inches and heights in feet is $J = 12H$. So $\mu_J = 12\mu_H = 12(5.8) = 69.6$ in and $\sigma_J = 12\sigma_H = 12(0.24) = 2.88$ in.

6.37 (a) The graph of the probability distribution (shown below) is skewed to the left. Most of the time, the ferry makes \$20 or \$25.



(b) $\mu_M = 5\mu_X = 5(3.87) = \$19.35$. If many ferry trips were selected at random, the ferry would collect about \$19.35 per trip, on average.
(c) $\sigma_M = 5\sigma_X = 5(1.29) = \$6.45$. The amounts collected on randomly selected ferry trips will typically vary by about \$6.45 from the mean (\$19.35).

6.38 (a) The graph of the probability distribution (shown below) is skewed to the right. Ana is more likely to get 1 or 2 tickets than 4 or 5.



(b) $\mu_T = \frac{1}{10}\mu_X = \frac{1}{10}(23.8) = 2.38$ tickets. After many rolls, Ana will receive about 2.38 tickets per roll, on average.
(c) $\sigma_T = \frac{1}{10}\sigma_X = \frac{1}{10}(12.63) = 1.263$ tickets. The number of tickets that Ana wins will typically vary by about 1.263 from the mean (2.38).

6.39 (a) The score on the test *G* is related to the number of questions *X* by the equation $G = 5X + 50$. This means that $\mu_G = 5\mu_X + 50 = 5(7.6) + 50 = 88$.
(b) $\sigma_G = 5\sigma_X = 5(1.32) = 6.6$.
(c) Because the variance of *G* is the square of the standard deviation $\sigma_G^2 = (5\sigma_X)^2 = 25\sigma_X^2$. In other words, the variance of *G* is 25 times the variance of *X*.

6.40 (a) The score on the test G is related to the number of questions X by the equation $G = 5X + 50$. This means that $\text{median}_G = 5\text{median}_X + 50 = 5(8.5) + 50 = 92.5$.
(b) $IQR_G = 5(IQR_X) = 5(9-8) = 5$.
(c) The shape of *G's* probability distribution will be the same as the shape of *X's*. Because the distance between the median and the minimum is much greater than the distance between the median and the maximum, both distributions are probably skewed to the left.

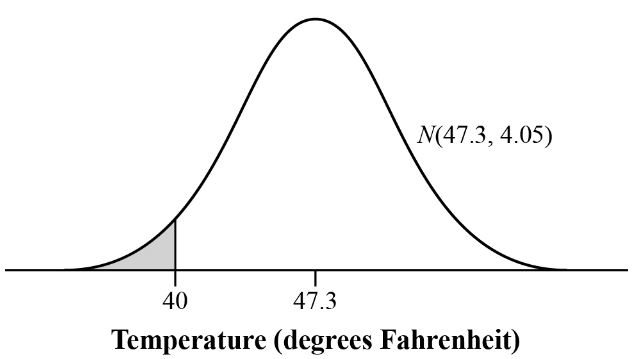
6.41 (a) $\mu_Y = \mu_M - 20 = 19.35 - 20 = -\$0.65$. If many ferry trips were selected at random, the ferry would lose about \$0.65 per trip, on average.
(b) $\sigma_Y = \sigma_M = \$6.45$. The amount of profit on randomly selected ferry trips will typically vary by about \$6.45 from the mean (–\$0.65).

6.42 (a) $\mu_X = 0(0.999) + 500(0.001) = \$0.50$.
$\sigma_X^2 = (0-0.50)^2(0.999) + (500-0.50)^2(0.001) = 249.75$ so $\sigma_X = \sqrt{249.75} = \$15.80$.
(b) $\mu_W = \mu_X - 1 = 0.50 - 1 = -\$0.50$. If you play this game many times, you will lose \$0.50 per game, on average. $\sigma_W = \sigma_X = \$15.80$. The amount you win per play will typically vary by about \$15.80 from the mean (–\$0.50).

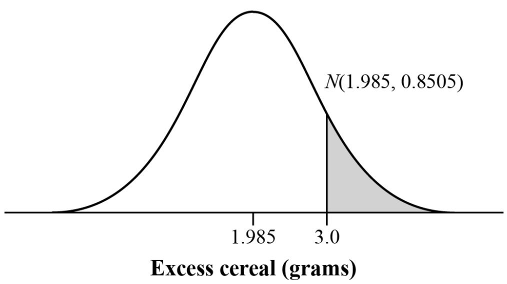
6.43 $\mu_Y = 6\mu_X - 20 = 6(3.87) - 20 = \$3.22$. $\sigma_Y = 6\sigma_X = 6(1.29) = \$7.74$.

6.44 $\mu_Y = 0.9\mu_X - 0.2 = 0.9(3) - 0.2 = \$2.5$ million and $\sigma_Y = 0.9\sigma_X = 0.9(2.52) = \$2.268$ million.

6.45 (a) $\mu_Y = \frac{9}{5}\mu_T + 32 = \frac{9}{5}(8.5) + 32 = 47.3$ degrees Fahrenheit. $\sigma_Y = \frac{9}{5}\sigma_T = \frac{9}{5}(2.25) = 4.05$ degrees Fahrenheit.
(b) **Step 1: State the distribution and values of interest.** Y has the $N(47.3, 4.05)$ distribution. We want to find $P(Y < 40)$ (see picture below). **Step 2: Perform calculations. Show your work.** The standardized score for the boundary value is $z = \frac{40 - 47.3}{4.05} = -1.80$. The desired probability is $P(Z < -1.80) = 0.0359$. *Using technology:* The command normalcdf(lower: –1000, upper: 40, µ: 47.3, σ: 4.05) gives an area of 0.0357. **Step 3: Answer the question.** There is a 0.0357 probability that the midnight temperature in the cabin is below 40ºF.



6.46 (a) $Y = 28.35X - 28.35(9.63)$, so
$\mu_Y = 28.35\mu_X - 28.35(9.63) = 28.35(9.70) - 273.01 = 1.985$ grams.
$\sigma_Y = 28.35\sigma_X = 28.35(0.03) = 0.8505$ grams.
(b) **Step 1: State the distribution and values of interest.** Y has the $N(1.985, 0.8505)$ distribution. We want to find $P(Y \geq 3)$ (see picture below). **Step 2: Perform calculations. Show your work.** The standardized score for the boundary value is $z = \frac{3-1.985}{0.8505} = 1.19$. The desired probability is $P(Z \geq 1.19) = 1 - 0.8830 = 0.1170$. *Using technology:* The command normalcdf(lower: 3, upper: 1000, μ: 1.985, σ: 0.8505) gives an area of 0.1164. **Step 3: Answer the question.** There is a 0.1164 probability of getting at least 3 grams more cereal than advertised.



6.47 (a) Yes. The mean of a sum is always equal to the sum of the means.
(b) No. The variance of the sum is not equal to the sum of the variances, because it is not reasonable to assume that X and Y are independent.

6.48 (a) Yes. The mean of a sum is always equal to the sum of the means.
(b) No. The variance of the sum is not equal to the sum of the variances, because it is not reasonable to assume that X and Y are independent.

6.49 Let Y_1 and Y_2 be the profit earned on days 1 and 2, respectively.
$\mu_{Y_1+Y_2} = \mu_{Y_1} + \mu_{Y_2} = (-0.65) + (-0.65) = -\$1.30$. Because Y_1 and Y_2 are independent,
$\sigma^2_{Y_1+Y_2} = \sigma^2_{Y_1} + \sigma^2_{Y_2} = 6.45^2 + 6.45^2 = 83.205$; $\sigma_{Y_1+Y_2} = \sqrt{83.205} = \$9.12$.

6.50 Let W_1 and W_2 be the winnings on days 1 and 2, respectively.
$\mu_{W_1+W_2} = \mu_{W_1} + \mu_{W_2} = (-0.50) + (-0.50) = -\$1.00$. Because W_1 and W_2 are independent,
$\sigma^2_{W_1+W_2} = \sigma^2_{W_1} + \sigma^2_{W_2} = 15.80^2 + 15.80^2 = 499.28$; $\sigma_{W_1+W_2} = \sqrt{499.28} = \$22.34$.

6.51 The total score deductions for a randomly selected essay is $3X + 2Y$. The mean and standard deviation of $3X$ are $\mu_{3X} = 3\mu_X = 3(2.1) = 6.3$ and $\sigma_{3X} = 3\sigma_X = 3(1.136) = 3.408$. The mean and standard deviation of $2Y$ are $\mu_{2Y} = 2\mu_Y = 2(1.0) = 2.0$ and $\sigma_{2Y} = 2\sigma_Y = 2(1.0) = 2.0$. Thus, $\mu_{3X+2Y} = \mu_{3X} + \mu_{2Y} = 6.3 + 2.0 = 8.3$ and, because the random variables are independent, $\sigma^2_{3X+2Y} = \sigma^2_{3X} + \sigma^2_{2Y} = 3.408^2 + 2.0^2 = 15.6145$; $\sigma_{3X+2Y} = \sqrt{15.6145} = 3.95$.

6.52 The total winnings for you and your friend is $T = W_1 + W_2 + W_3 + W_4 + W_5 + 5W_6$ where W_1 through W_5 are the winnings for each of the 5 days your friend plays and $5W_6$ is the winnings for the 1 day that you play. The mean and standard deviation of $5W_6$ are $\mu_{5W_6} = 5\mu_W = 5(-0.50) = -2.50$ and $\sigma_{5W_6} = 5\sigma_W = 5(15.80) = 79$. Thus, $\mu_T = -0.50 + -0.50 + -0.50 + -0.50 + -0.50 + -2.50 = -\$5.00$ and, because the random variables are independent, $\sigma_T^2 = 15.80^2 + 15.80^2 + 15.80^2 + 15.80^2 + 15.80^2 + 79^2 = 7489.2$; $\sigma_T = \sqrt{7489.2} = \$86.54$.

6.53 (a) $\mu_{Y-X} = \mu_Y - \mu_X = 1.0 - 2.1 = -1.1$. If you were to select many essays, there would be about 1.1 fewer word errors than nonword errors, on average.
Because the number of nonword and word errors are independent,
$\sigma_{Y-X}^2 = \sigma_Y^2 + \sigma_X^2 = (1.0)^2 + (1.136)^2 = 2.2905$ so $\sigma_{Y-X} = \sqrt{2.2905} = 1.51$. The difference in the number of errors will typically vary by about 1.51 from the mean (–1.1).
(b) Let $D = Y - X$. If we want to find the probability that there are more word errors than nonword errors, then we are asking for $P(D > 0)$. The outcomes that make up this event are 1 – 0 = 1, 2 – 0 = 2, 2 – 1 = 1, 3 – 0 = 3, 3 – 1 = 2, 3 – 2 = 1. Because *X* and *Y* are independent, then we can calculate the probabilities of these of these events. For example
$P(D=1) = P[(Y=1 \cap X=0) \cup (Y=2 \cap X=1) \cup (Y=3 \cap X=2)]$
$= (0.3)(0.1) + (0.2)(0.2) + (0.1)(0.3) = 0.10$. Similarly
$P(D=2) = P[(Y=2 \cap X=0) \cup (Y=3 \cap X=1)] = (0.2)(0.1) + (0.1)(0.2) = 0.04$ and
$P(D=3) = P(Y=3 \cap X=0) = (0.1)(0.1) = 0.01$. So there is a 0.10 + 0.04 + 0.01 = 0.15 probability that a randomly chosen student will have more word errors than nonword errors.

6.54 (a) $\mu_{F-M} = \mu_F - \mu_M$ = 120 – 105 = 15 points. If you were to repeat the process of selecting a single male student, selecting a single female student, and finding the difference in their scores (female – male) many times, the difference would be about 15 points, on average. Because the students were randomly selected, their scores should be independent. Thus,
$\sigma_{F-M}^2 = \sigma_F^2 + \sigma_M^2 = 28^2 + 35^2 = 2009$, so $\sigma_{F-M} = \sqrt{2009} = 44.8219$ points. The difference in scores (female – male) will typically vary by about 44.8219 from the mean (15).
(b) We cannot find the probability based on only the mean and standard deviation because we do not know the shapes of the distributions. We cannot assume that the distributions are Normal without additional information.

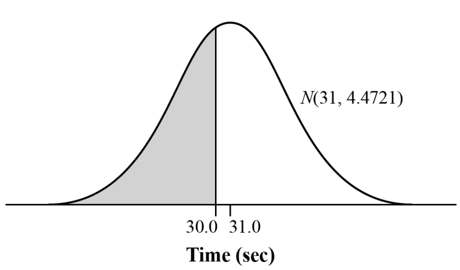
6.55 The difference in score deductions for a randomly selected essay is $3X - 2Y$. The mean and standard deviation of $3X$ are $\mu_{3X} = 3\mu_X = 3(2.1) = 6.3$ and $\sigma_{3X} = 3\sigma_X = 3(1.136) = 3.408$. The mean and standard deviation of $2Y$ are $\mu_{2Y} = 2\mu_Y = 2(1.0) = 2.0$ and $\sigma_{2Y} = 2\sigma_Y = 2(1.0) = 2.0$. Thus, $\mu_{3X-2Y} = \mu_{3X} - \mu_{2Y} = 6.3 - 2.0 = 4.3$ and, because *X* and *Y* are independent, $\sigma_{3X-2Y}^2 = \sigma_{3X}^2 + \sigma_{2Y}^2 = 3.408^2 + 2.0^2 = 15.6145$; $\sigma_{3X-2Y} = \sqrt{15.6145} = 3.95$.

6.56 The difference winnings for you and your friend is $D = 5W_6 - (W_1 + W_2 + W_3 + W_4 + W_5)$ where W_1 through W_5 are the winnings for each of the 5 days your friend plays and $5W_6$ is the winnings for the 1 day that you play. The mean and standard deviation of $5W_6$ are $\mu_{5W_6} = 5\mu_W = 5(-0.50) = -\$2.50$ and $\sigma_{5W_6} = 5\sigma_W = 5(15.80) = \$79$. Thus, $\mu_D = -2.50 - (-0.50 + -0.50 + -0.50 + -0.50 + -0.50) = \$0$ and, because the random variables are independent, $\sigma_D^2 = 79^2 + 15.80^2 + 15.80^2 + 15.80^2 + 15.80^2 + 15.80^2 = 7489.2$; $\sigma_D = \sqrt{7489.2} = \$86.54$.

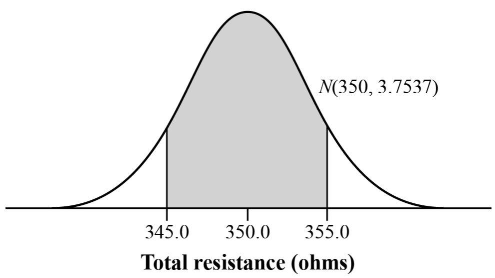
6.57 $\mu_{X_1+X_2} = \mu_X + \mu_X = 303.35 + 303.35 = \$606.70$, and, because the variables are independent, $\sigma^2_{X_1+X_2} = \sigma^2_X + \sigma^2_X = 9707.57^2 + 9707.57^2 = 188,473,830.6$ and $\sigma_{X_1+X_2} = \sqrt{188,473,830.6} = \$13,728.58$. $W = \frac{1}{2}(X_1 + X_2)$ so $\mu_W = \frac{1}{2}(606.70) = \$303.35$ and $\sigma_W = \frac{1}{2}(13,728.58) = \$6864.29$.

6.58 $\mu_{X_1+X_2+X_3+X_4} = \mu_X + \mu_X + \mu_X + \mu_X = 303.35 + 303.35 + 303.35 + 303.35 = \$1213.40$, and, because the variables are independent, $\sigma^2_{X_1+X_2+X_3+X_4} = \sigma^2_X + \sigma^2_X + \sigma^2_X + \sigma^2_X = 9707.57^2 + 9707.57^2 + 9707.57^2 + 9707.57^2 = 376,947,661.2$ and $\sigma_{X_1+X_2+X_3+X_4} = \sqrt{376,947,661.2} = \$19,415.14$. $V = \frac{1}{4}(X_1 + X_2 + X_3 + X_4)$ so $\mu_V = \frac{1}{4}(1213.40) = \$303.35$ and $\sigma_V = \frac{1}{4}(19,415.14) = \$4853.785$. The standard deviation of *V* is less than the standard deviation of *W*, and exactly half of the standard deviation of *X*.

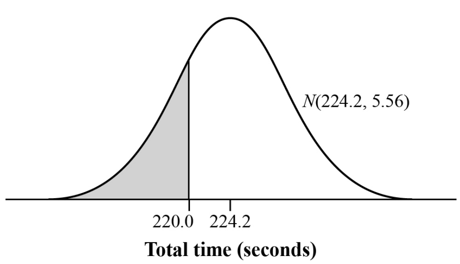
6.59 (a) The total time for the process follows a Normal distribution with mean = 11 + 20 = 31 seconds and, because the variables are independent, standard deviation = $\sqrt{2^2 + 4^2} = 4.4721$ seconds.
(b) **Step 1: State the distribution and values of interest.** The total time for the process has the *N*(31, 4.4721) distribution. We want to find the probability that the total time is less than 30 seconds (see picture below). **Step 2: Perform calculations. Show your work.** The standardized score for the boundary value is $z = \frac{30-31}{4.4721} = -0.22$. The desired probability is $P(Z < -0.22) = 0.4129$. *Using technology:* The command normalcdf(lower: –1000, upper: 30, μ: 31, σ: 4.4721) gives an area of 0.4115. **Step 3: Answer the question.** There is a 0.4115 probability of completing the process in less than 30 seconds for a randomly selected part.



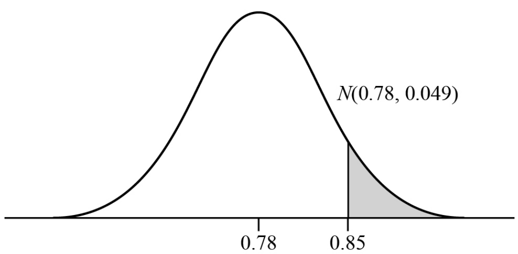
6.60 (a) The total resistance follows a Normal distribution with mean 100 + 250 = 350 ohms and, because the variables are independent, standard deviation = $\sqrt{2.5^2 + 2.8^2} = 3.7537$ ohms.
(b) **Step 1: State the distribution and values of interest.** The total resistance has the *N*(350, 3.7537) distribution. We want to find the probability that the total resistance is between 345 and 355 ohms (see picture below). **Step 2: Perform calculations. Show your work.** The standardized scores for the boundary values are $z = \dfrac{345 - 350}{3.7537} = -1.33$ and $z = \dfrac{355 - 350}{3.7537} = 1.33$. The desired probability is $P(-1.33 < Z < 1.33) = 0.9082 - 0.0918 = 0.8164$. *Using technology:* The command normalcdf(lower: 345, upper: 355, μ: 350, σ: 3.7537) gives an area of 0.8171. **Step 3: Answer the question.** There is a 0.8171 probability that the total resistance is between 345 and 355 for a randomly selected toaster.



6.61 **Step 1: State the distribution and values of interest.** Let *T* = the total team swim time and X_1 be Wendy's time, X_2 be Jill's time, X_3 be Carmen's time, and X_4 be Latrice's time. Then $T = X_1 + X_2 + X_3 + X_4$. The mean is $\mu_T = \mu_1 + \mu_2 + \mu_3 + \mu_4 = 55.2 + 58.0 + 56.3 + 54.7 = 224.2$ seconds. Because the random variables are independent, the variance is $\sigma_T^2 = \sigma_{X_1}^2 + \sigma_{X_2}^2 + \sigma_{X_3}^2 + \sigma_{X_4}^2 = (2.8)^2 + (3.0)^2 + (2.6)^2 + (2.7)^2 = 30.89$ and the standard deviation is $\sigma_T = \sqrt{30.89} = 5.56$ seconds. Because each individual's time is approximately Normally distributed, *T* is also approximately Normally distributed. Thus *T* has the *N*(224.2, 5.56) distribution. We want to find $P(T < 220)$ (see picture below). **Step 2: Perform calculations. Show your work.** The standardized score for the boundary value is $z = \dfrac{220 - 224.2}{5.56} = -0.76$. The desired probability is $P(Z < -0.76) = 0.2236$. *Using technology:* The command normalcdf(lower: –1000, upper: 220, μ: 224.2, σ: 5.56) gives an area of 0.2250. **Step 3: Answer the question.** There is a 0.2250 probability that the total team time is less than 220 seconds in a randomly selected race.

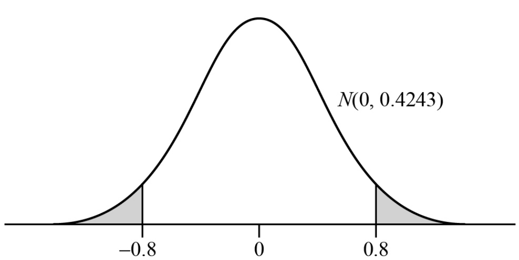


6.62 **Step 1: State the distribution and values of interest.** Let T be the total amount of toothpaste, so $T = X_1 + X_2 + X_3 + X_4 + X_5 + X_6$. Each of the X's has a $N(0.13, 0.02)$ distribution and it is reasonable to assume that the X's are independent. So,
$\mu_T = 0.13 + 0.13 + 0.13 + 0.13 + 0.13 + 0.13 = 0.78$ ounces,
$\sigma_T^2 = 0.02^2 + 0.02^2 + 0.02^2 + 0.02^2 + 0.02^2 + 0.02^2 = 0.0024$, and $\sigma_T = \sqrt{0.0024} = 0.049$ ounces.
Thus, T has the $N(0.78, 0.049)$ distribution. We want to find $P(T > 0.85)$ (see picture below).
Step 2: Perform calculations. Show your work. The standardized score for the boundary value is $z = \frac{0.85 - 0.78}{0.049} = 1.43$. The desired probability is $P(Z > 1.43) = 1 - 0.9236 = 0.0764$. Using technology: The command normalcdf(lower: 0.85, upper: 1000, μ: 0.78, σ: 0.049) gives an area of 0.0766. **Step 3: Answer the question.** There is a 0.0766 probability that Ken will use the entire tube of toothpaste on a randomly selected trip.



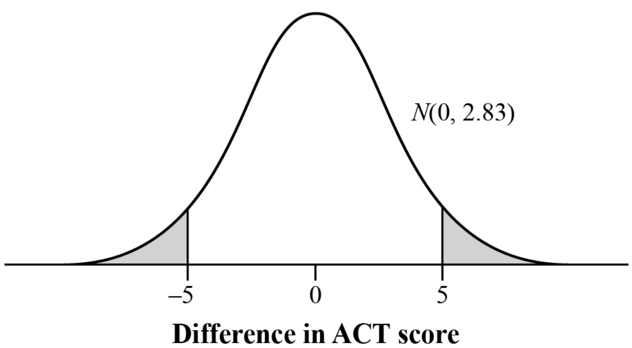
Total amount of toothpaste (ounces)

6.63 **Step 1: State the distribution and values of interest.** Let D = the difference in NOX levels and X_1 be the NOX level in the first car and X_2 be the NOX level in the second car. Then $D = X_1 - X_2$. The mean is $\mu_D = \mu_{X_1} - \mu_{X_2} = 1.4 - 1.4 = 0$. Because the random variables are independent, the variance is $\sigma_{X_1 - X_2}^2 = \sigma_{X_1}^2 + \sigma_{X_2}^2 = 0.3^2 + 0.3^2 = 0.18$ and the standard deviation is $\sigma_{X_1 - X_2} = \sqrt{0.18} = 0.4243$. Because the NOX levels for each car are Normally distributed, D is also Normally distributed. Thus, D has the $N(0, 0.4243)$ distribution. We want to find $P(D > 0.8 \text{ or } D < -0.8) = P(D > 0.8) + P(D < -0.8)$ (see picture below). **Step 2: Perform calculations. Show your work.** The standardized scores for the boundary values are $z = \frac{0.8 - 0}{0.4243} = 1.89$ and $z = \frac{-0.8 - 0}{0.4243} = -1.89$. The desired probability is $P(Z < -1.89 \text{ or } Z > 1.89) = 0.0294 + 0.0294 = 0.0588$. *Using technology:* The command 1 – normalcdf(lower: –0.8, upper: 0.8, μ: 0, σ: 0.4243) gives an area of 1 – 0.9406 = 0.0594. **Step 3: Answer the question.** There is a 0.0594 probability that difference is at least as large as the attendant observed.



Difference in NOX

6.64 **Step 1: State the distribution and values of interest.** Let D = the difference in ACT scores and X_1 be Leona's ACT score and X_2 be Fred's ACT score. Then $D = X_1 - X_2$. The mean is $\mu_D = \mu_{X_1} - \mu_{X_2} = 24 - 24 = 0$. Because the random variables are independent, the variance is $\sigma^2_{X_1 - X_2} = \sigma^2_{X_1} + \sigma^2_{X_2} = 2^2 + 2^2 = 8$ and the standard deviation is $\sigma_{X_1 - X_2} = \sqrt{8} = 2.83$. Because the ACT scores for both students are Normally distributed, D is also Normally distributed. Thus, D has the $N(0, 2.83)$ distribution. We want to find $P(D \geq 5 \text{ or } D \leq -5) = P(D \geq 5) + P(D \leq -5)$ (see picture below). **Step 2: Perform calculations. Show your work.** The standardized scores for the boundary values are $z = \dfrac{5-0}{2.83}$ = 1.77 and $z = \dfrac{-5-0}{2.83}$ = –1.77. The desired probability is $P(Z \leq -1.77 \text{ or } Z \geq 1.77)$ = 0.0384 + 0.0384 = 0.0768. *Using technology:* The command 1 – normalcdf(lower: –5, upper: 5, µ: 0, σ: 2.83) gives an area of 1 – 0.9227 = 0.0773. **Step 3: Answer the question.** There is a 0.0773 probability that the scores differ by 5 or more points in either direction.



6.65 c.

6.66 d.

6.67 (a) Fidelity Technology Fund is more closely tied to the stock market as a whole, because its correlation is larger.
(b) No, the correlation doesn't tell us anything about the values of the variables, only about the strength of the linear relationship between them.

6.68 (a) After one day the stock is either worth \$1300 (gain of 30%) or \$750 (loss of 25%), each with probability 0.5. If the stock goes up the first day, then it is either worth \$1690 (30% gain) or \$975 (25% loss) after the second day. If the stock goes down the first day, then it is either worth \$975 (30% gain) or \$562.50 (25% loss) after the second day. Since gain or loss is equally likely both days, the four different outcomes each have probability 0.25. Note, however, that there are two ways to get \$975. So the probability distribution is

Amount	\$562.50	\$975	\$1690
Probability	0.25	0.50	0.25

The probability that the stock is worth more than the \$1000 paid for it, after two days, is 0.25 (the probability of it being worth \$1690).
(b) The mean value after two days is $\mu = 562.50(0.25) + 975(0.5) + 1690(0.25) = \$1{,}050.63$.